

REMARKS

Applicant respectfully requests reconsideration of the Final Rejection of claims 1, 2, 5 and 15, which are currently amended without the addition of new subject matter. Claims 18, 28, 29 and 30 were previously allowed, and claims 3, 4, 6, 14, 16, 17 and 19-27 were previously withdrawn.

In the Final Rejection, claims 1 and 2 were rejected under 35USC§102(b) and claims 5 and 15 were rejected under 35USC§103. Applicant has, for clarity, amended these claims in view of the Office action, to further amplify the distinctions over the prior art. The claims, however, are submitted to have been allowable in their prior form. Applicant will consider the claims in numerical sequence, referring both to the rejections on pages 2-5 and the “Response to Arguments” set forth on pages 5-8.

Claim 1. The Office action submits that the rejection of claim 1 on Larsson US 4,968,068 on §102(b), as fully anticipated in ¶3(a) on p. 3 is justified because, the “mere recitation” (quoting ¶5 on p. 5 of the Office action) of “sucker rods instead of “drill rods” does not amount to a patentable distinction. However, taking the claims as a whole, the contextual difference in application gives meaningful patentable import to the way in which the elements are prestressed and effectively locked into a fatigue resistance combination. Moreover, the requirements for an improved sucker rod system are so specific and critical that there is no equivalency with drill rods, or “percussive drills”, as taught in Larsson. Whereas a sucker rod string may have to operate over the millions of cycles bearing the weight of petroleum and the weight of the string itself along what might be a substantial distance, a percussive drill, on the other hand, operates only unidirectionally, impacting a drill bit at the end of the drill rods to penetrate rock or earth formations. The percussive drill, as in Larsson, accepts the wear and degradation of the drill rods and does not seek to ameliorate such effects as it wears out over a period of time.

Thus, the recitation of prestressing the pin ends of opposing sucker rods with “compressional loading forces” (claim 1 as amended) has highly meaningful significance in the sucker rod art. This is achieved structurally by relation to the end faces of the pin ends, by relation of the length of the coupler to the dimensions of the pin ends, and the penetration of the male threaded sections past engagement of the coupler end engagement

member with the coupler ends. The wedging force of the threading after the first contact (i.e. the hand tight plane) then establishes the prestressing, which minimizes the inception and growth of microcracks, and the consequent onset of fatigue failure, as set forth fully in the instant specification.

The recitation in the Office action of the structure of Larsson (Fig. 2) is generally correct, but only up to a crucial point, at which the Larsson teaching is significantly misinterpreted.

Larsson does not disclose pin ends dimensioned in length relative to the coupler to provide “compressional loading forces between opposing end faces of the pin ends.” The gap “ δ ” in Larsson is something less than 1 mm to avoid such loading. It may be 0, as theorized, but with “0 gap” there is compression. The gap must be employed, as Larsson teaches, to “assuredly” provide “a shoulder contact” (Col. 2, lines 13-14); and (Col. 3, lines 5-10), so that bending moments are minimized during “wearing in” (Col. 3, lines 16-18). If the gap is zero (0), there is no compressional loading force or “prestressing”. As the Larsson thread is “worn in”, there is no prestressing because there is only impact deformation.

Whether sucker rods are coupled to a reciprocating pump, which causes rod forces varying between different levels of tension, or between tension and compression, or whether the pump is of the progressive or rotary type, which operates essentially unidirectionally, both must withstand the significant masses of the petroleum being pumped and the weight of the sucker rod string. There is no reasonable possibility that those skilled in the art would look at the drill rod technology or try to find a source for the problem of enhancing life cycle periods in sucker rods.

The Office action is therefore, it is respectfully submitted erroneous in attributing any compressional preloading to the spaced apart end faces of Larsson. This is affirmed by the fact that 1 mm, the specified maximum gap would be a very large dimensional tolerance for any modern manufactured item.

The broad statement in ¶3(a) that Larson shows a “connection for sucker rods used in strings in petroleum wells” is further not justified by the argument on p. 5 that “claim limitations are to be given their broadest reasonable reading”. There is no justification for defining rods 12' and 12" of Larsson as “sucker rods”, in view of the

long term use of and specific properties needed in such rods. This is not an interpretation as much as a nonobvious excursion from the well accepted meaning of the term. Similarly, the argument on p. 6 as to anticipation, which contends that the prior art reference need not teach what the application at issue teaches, in effect converts the anticipation argument to a broad restructuring of the requirements of disclosure. In other words, the stated interpretation grants the Office the unwarranted right to extend anticipation to something other than relevant subject matter.

The essence of the question involved here is whether, in the words of Para. 5a on p. 6, Larsson actually “shows and discloses the claim structure”. Larsson does not in any way teach a combination in which lengths and elements are selected such that opposing end faces of the pin ends of a sucker rod combination are placed under compressional loading forces by further threading penetration past the point of initial engagement. To make this more clear, claim 1 has been amended, without new matter to specify more details of the geometry of the lengths of the coupler and the pin ends of the sucker rods that are utilized in establishing the “prestressing compressional loading forces”.

Contrary to what is stated in the Office action, claim 1 has a clear recitation of a meaningful operation relationship that defines structural features and patentably distinguishes over the Larsson reference. Structure is defined in terms of the length and positional relationships which make it possible for prestressing to occur after first engagement, which is a further patentable distinction. There is no suggestion whatsoever in Larsson of confronting a fatigue problem, and indeed Larsson anticipates wear of the drill rod surfaces occurring until closure of the gap occurs, at preferably 20% maximum of the drill life. When the gap between the facing drill rods in Larsson is reduced by linear impact wear to zero there is no prestressing or compressional loading forces, as occurs when threading past the hand tight plane. The reasons for this type of thread, the conventional use of drill tubes and cooling water, the coupling to terminal drill bit, and the means by which debris is extracted or washed out of the drill hole is apparently assumed to be known by those familiar with the drill rod art and therefore not discussed..

Claim 2. This claim, dependent from claim 1, distinguishes over Larsson for the same reasons and further sets forth the relationships by which the pin end sections are prestressed in compression and the coextensive lengths of the coupler are prestressed in

tension and the mating threads lock under prestress to inhibit relative movement. The argument in the Office action is based upon the contention that the connection shown in Fig. 2 of Larsson will “inherently” have a preselected penetration (in the coupler)...beyond “insertion to a hand tight plane”. There is no teaching in Larsson of prestressing compression and tension and no discussion of a hand tight plane or penetration beyond. The gap δ in Larsson that justifies such an interpretation, because in Larsson “the gap is either zero or a positive value up to 1 mm...so that it is not negative” (Col. 3, lines 7-8 emphasis supplied). At the limit ($\delta = 0$) the surface 16', 16” in Larsson may teach, but they do not prestress in any way. in the structure of Larsson when the gap δ is zero. This ascribes gratuitously only to Larsson a teaching that he does not show or suggest, namely that the gap, which may be zero at a minimum, somehow introduces prestressing, which is cannot.

Claims 5 and 15. Claim 5 distinguishes for the same reasons as parent claim 1 and claim 15 distinguishes in different terminology but for like reasons. These claims utilize an interposed element, such as a torque washer, between the pin ends of two sucker rods which have selected length relationships to the coupler, as discussed above. The prestressing relationships of claim 1 are retained, in claims 5 and 15 as amended. The introduction of an interior element into Larsson between the opposing ends of his drill rods cannot arrive at the combinations of claims 5 and 15. The Watson et al device is a shift lever with the interposed element being an integral part of or sleeve, the Carlson device is a filament reinforced sucker rod with a central, nonconductive coupling plug 89 (Col. 13, lines 55-61) and Reding et al teach the use of a cotter 26 insert above 18 connecting two rods 10, 12. These devices would serve no useful purpose in the Larsson structure, since the minimal gap in Larsson is merely for the purpose of assuring that there is no loading contact. Second, the insertion of such elements from the secondary references are not based on any suggestion of Larsson that such a modification could be made, or that any statement in the references that they could be used for a different purpose, such as in a drill rod combination. Third, it is not seen how dimensionally or geometrically an element could be positioned within the drill pins of Larsson (Fig. 2).

Consequently, claims 5 and 15 also are submitted to distinguish over the art as cited as to which obviousness has not been shown.

SUMMARY

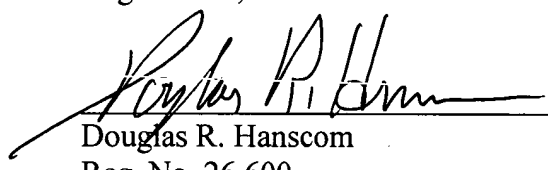
In the light of the above considerations applicant respectfully requests reconsideration of the rejection of claims 1, 2, 5 and 15, and entry of the present amendment as placing this application in condition for allowance, or in better condition for appeal. Active claims 18, 28, 29 and 30 were previously allowed.

Respectfully submitted,

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